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## American River Basin

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## Overview

Presented in this attachment are draft monitoring, assessment and performance measures for the fifteen projects that comprise this American River Basin (ARB) Integrated Regional Water Management (IRWM) Proposition (Prop) 84 Implementation Grant Proposal. Project Performance Measures tables are included for each project; these present the following project-specific information:

- Project goals
- Desired outcomes
- Output indicators – measures to effectively track output
- Outcome indicators – measures to evaluate change that is a direct result of the work
- Measurement tools and methods
- Measurable targets that are feasible to meet during the life of the Proposal

The Project Performance Measures tables presented below will be used to develop a program-level Project Performance Monitoring Plan that includes project-specific monitoring criteria and an implementation schedule for each project. These project-specific chapters will be established and administered for each project to assess and evaluate the project's performance and as a tool for reporting on their implementation. Project-specific costs shares for preparing the proposal-wide Project Performance Monitoring Plan is included in each project budget, in Row (g) Other Costs. The implementation of each Project Performance Monitoring Plan will be conducted under Row (e) Environmental Compliance/Mitigation/Enhancement.

In compliance with the four Groundwater Management Plans for the region, the ARB IRWMP participants have an extensive groundwater monitoring network for monitoring water elevation and quality, and to a lesser extent, land subsidence. These monitoring activities help the ARB region maintain the quantity and quality of the groundwater through meeting pre-determined Basin Management Objectives (BMOs). The groundwater data collected as part of many of these projects will be incorporated into the data collection and analysis currently underway. Additionally, at the State level, data will be disseminated to the Surface Water Ambient Monitoring Program (SWAMP) and the new California Statewide Groundwater Elevation Monitoring (CASGEM) Program, as applicable. Data also will be disseminated to California Department of Water Resources (DWR) for inclusion in its databases such as the Water Data Library, which contains groundwater level and water quality data.

## Project 1: City of Roseville ASR Program – Phase 2 (*City of Roseville*)

### Project Summary

The City of Roseville Aquifer Storage and Recovery (ASR) Program is an element of the comprehensive, regional conjunctive use program for southern Placer County and northern Sacramento County known as the Regional Water Master Plan. Through the ASR Program, available water supplies from the City of Roseville's water treatment plant will be injected into the groundwater basin for extraction during droughts or in emergency situations, thus maximizing the use of surface water entitlements and enhancing operational flexibility for water users of Folsom Lake, the lower American River, and the connected groundwater basin.

The ASR Program will employ thirteen specially designed wells capable of both water injection and groundwater extraction. Construction of these wells has been divided into three phases. Phase 1, which has already been implemented, consisted of the construction of four wells, including wellhead facilities. Phase 2, which is underway and which is the portion of the program currently seeking funding, consists of two wells - the Hayden Parkway Well and West Park #1 Well. The two wells have already been constructed; funding is being sought for installation of wellhead facilities. The seven remaining wells and associated wellhead facilities will be installed in future phases.

### Project Performance Measures Table

Table 1 is the Project Performance Measures table for the City of Roseville ASR Program – Phase 2. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

In order to determine whether the project is successful in meeting its goals and desired outcomes, water meter data and water level data that are collected will be analyzed to determine injection and extraction rates, well performance, the volume of water distributed to the Zone 4 distribution system of the City, and the changes in groundwater elevation. The water meter and water elevation data will be collected monthly by City staff for the performance monitoring duration of 10 years.

**Table 1: City of Roseville ASR Program – Phase 2 Project Performance Measures**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Increase groundwater banking capacity</li> <li>- Increase water supply reliability</li> <li>- Improve emergency supply response</li> <li>- Increase conjunctive use ability</li> <li>- Protect existing groundwater sources</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Inject treated surface water into groundwater aquifer</li> <li>- Extract groundwater from aquifer</li> <li>- Distribute extracted groundwater to Zone 4 of Roseville water distribution system</li> <li>- Provide additional data for groundwater basin management</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Readings from well water meters</li> <li>- Readings from distribution water meters</li> <li>- Groundwater elevation readings from wells</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of acre-feet of water injected</li> <li>- Number of acre-feet of water extracted</li> <li>- Number of acre-feet of water delivered to Zone 4</li> <li>- Change in groundwater elevations</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - water meter data  <u>Method</u> - use meter data to monitor monthly water injection and extraction rates; bi-annually analysis of meter data to evaluate well performance</p> <p><u>Tool</u> - water meter data  <u>Method</u> - use meter data to determine monthly the volume of water delivered to the Zone 4 distribution system</p> <p><u>Tool</u> - water level data collected via sounder monthly  <u>Method</u> - evaluate data to determine changes in groundwater elevation</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Inject an annual average of 480 AFY into basin for recharge</li> <li>- Extract an annual average of 480 AFY from basin</li> <li>- Deliver an annual average of 480 AFY to Zone 4</li> <li>- Maintain groundwater elevations as close to current as possible</li> </ul>

## Project 2: Secret Ravine Fish Passage Improvement Project (*City of Roseville*)

### Project Summary

Secret Ravine is a perennial stream within the Dry Creek Watershed in western Placer County. The stream supports spawning, juvenile rearing and emigration of Central Valley fall run Chinook salmon (*Oncorhynchus tshawytscha*) as well as spawning, seasonal rearing and migration of Central Valley ESU steelhead (*Oncorhynchus mykiss*). Dry Creek Watershed is part of the area designated by National Oceanic and Atmospheric Administration (NOAA) as critical habitat for steelhead trout.

The Secret Ravine Fish Passage Improvement Project, which will be implemented by the City of Roseville in conjunction with Dry Creek Conservancy, aims to remove an abandoned bridge and utility crossing that are obstructing the passage of salmonid. The project also includes modification of the channel bed to accommodate passage for all species of salmonids at all flows and installation of large woody debris structures to provide habitat and high flow refugia. As well as improving fish habitat, the channel alterations will protect the streambanks from erosion and relieve flooding in surrounding areas of development. The project also offers an educational benefit, as trail improvements with interpretive signage will be implemented to encourage the public to visit and learn about salmon, steelhead and water quality issues.

This project is identified in Bulletin 250 (2005), a Fish Passage Improvement Program (FPIP) component of the CalFed Ecosystem Restoration Program.

### Project Performance Measures Table

The Project Performance Measures table for the Secret Ravine Fish Passage Improvement Project is shown as Table 2. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

Because the primary goals of the project are to increase aquatic habitat for salmonid, improve flood management and increase public education on salmonids and urban streams, the City of Roseville will track fish counts, the number of visitors to the site, the bank height and the estimated areas of salmonid spawning beds. To determine this information, City staff will measure the square footage of the area created by the project, perform spot checks of the number of visitors to the site, and coordinate with the Dry Creek Conservancy to have staff and volunteers count the number of salmonids, redds and carcasses in the fall. Measurements of the stream banks will also be taken following construction and compared to pre-project conditions and will be used to determine the impact to flood waters during ten-year storms.

**Table 2: Secret Ravine Fish Passage Improvement Project Performance Measures**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Increase aquatic habitat available for salmonid spawning, rearing and migration within Dry Creek Watershed</li> <li>- Improve flood management by removing flow restricting barrier and reconnecting channel to the flood plain</li> <li>- Provide educational opportunities to the general public regarding the lifecycle of salmonids and human impacts on urban streams</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Increase salmonid spawning in the Dry Creek Watershed</li> <li>- Improve bank stability</li> <li>- Increase flow of nutrients to floodplain</li> <li>- Reduce localized flooding in area</li> <li>- Increase visits of public to site</li> <li>- Remove unmaintained structure with liability potential</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Fish counts</li> <li>- Visitor counts</li> <li>- Bank height</li> <li>- Area estimates of spawning beds</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of fish observed in the creek in the fall</li> <li>- Number of visitors at the site</li> <li>- Number of feet increase in stream bank height</li> <li>- Number of square feet of spawning beds</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - fall fish counts  <u>Method</u> - Dry Creek Conservancy staff and volunteers walk Secret Ravine during the fall and count number of salmonids, redds and carcasses</p> <p><u>Tool</u> - count number of public visits to site  <u>Method</u> - periodically spot check the site to determine number of visitors and compare to pre-project visitor numbers</p> <p><u>Tool</u>-field measurement of stream bank height  <u>Method</u>- compare measure of current stream banks to stream bank height at the completion of the project to ascertain the impact to flood waters during a ten-year storm.</p> <p><u>Tool</u>-measure area of spawning gravel  <u>Method</u>- measure square footage of area created by project</p>

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<b>Targets</b>	<ul style="list-style-type: none"><li>- Increase the number of salmonid returning to spawn by 20%</li><li>- Increase public site visits by 50% per year in the year subsequent to the completion of the project</li><li>- Prevent localized flood in area immediately upstream during the ten year storm</li><li>- Increase spawning area by 1,000 square feet</li></ul>
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## Project 3: E.A. Fairbairn Groundwater Well Project (*City of Sacramento*)

### Project Summary

The E.A. Fairbairn Groundwater Well Project is identified in the *2011 Water Master Plan* currently being prepared for the City of Sacramento. As suggested in drafts of the master plan, and as previously documented in the City's *2005 Water Distribution Master Plan*, significant growth has occurred in the service area, necessitating the development of additional groundwater wells to meet increasing water demand. The 2 million gallon per day (mgd) E.A. Fairbairn Groundwater Well will be constructed at the City's existing E.A. Fairbairn Water Treatment Plant site. The plant treats surface water diversions from the American River. Co-locating the groundwater well and surface water treatment plant provides the opportunity to blend groundwater with surface water and to allow for conjunctive use of the two water supplies.

During an average year, the E.A. Fairbairn Groundwater Well will operate 65% of the time, producing 1,462 acre-feet per year (AFY). In dry years, the well operation will increase to 100% of the time, producing 2,250 AFY and offsetting surface water diversions, thereby reducing the impact on the lower American River. In wet years, the well will only be operated 15% of the time, producing 337 AFY.

### Project Performance Measures Table

Table 3 is the Project Performance Measures Table for the E.A. Fairbairn Groundwater Well Project. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

Water meter data and groundwater level data will be the kinds of data required in order to determine the volume of water extracted from the new groundwater well, the volume of water blended with surface water, the volume of water delivered to users, and the change in groundwater elevations. These are the outcome indicators that will help evaluate changes that result directly from implementation of the project. Readings from the well water meters to monitor monthly extraction rates will be performed, and the meter data will be evaluated on a bi-annual basis. The distribution water meters will be monitored monthly to determine the amount of water delivered. Water level data will be collected using sounders each month.

**Table 3: E.A. Fairbairn Groundwater Well Project Performance Measures Table**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Increase water supply reliability</li> <li>- Improve emergency supply response</li> <li>- Increase conjunctive use ability</li> <li>- Reduce impacts on Lower American River</li> <li>- Diversify water supply portfolio</li> <li>- Provide blending opportunities to improve potable water quality</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Extract groundwater from aquifer</li> <li>- Provide conjunctive use opportunities</li> <li>- Provide emergency supply source</li> <li>- Provide opportunity to blend surface and groundwater</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Readings from well water meters</li> <li>- Readings from distribution water meters</li> <li>- Groundwater elevation readings from wells</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of acre-feet of water extracted</li> <li>- Number of acre-feet of water blended</li> <li>- Number of acre-feet of water delivered</li> <li>- Change in groundwater elevations</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - water meter data  <u>Method</u> - use meter data to monitor monthly water extraction rates; bi-annually analysis of meter data to evaluate well performance</p> <p><u>Tool</u> - water meter data  <u>Method</u> - use meter data to determine monthly the volume of water delivered</p> <p><u>Tool</u> - water level data collected via depth sounder  <u>Method</u> - evaluate data to determine changes in groundwater elevation</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Produce 2,250 AFY of groundwater in dry years; 1,462 AFY of groundwater in normal years; and 337 AFY of groundwater in wet years</li> <li>- Deliver 100% of extracted groundwater</li> <li>- Maintain groundwater elevations as close to current as possible</li> </ul>

## Project 4: Shasta Park Reservoir and Well Project (*City of Sacramento*)

### Project Summary

The Shasta Park Reservoir and Well Project is a water supply project which benefits disadvantaged communities (DACs) within the City of Sacramento. The City's 2005 *Water Distribution Master Plan* identified additional customer demands due to significant growth in the area and detailed the need for additional groundwater wells to meet those demands. Additionally, the master plan documented the need for distribution system upgrades in order to correct deficiencies (specifically, low pressures and reduced emergency and fire suppression water supplies) that affect the southeast portion of Sacramento, a region known to include DACs. The Shasta Park Reservoir and Well Project meets both of these needs through the installation of a 2 mgd groundwater well, a 4 million gallon (MG) reservoir and a booster pump station at Shasta Park.

During an average year, the Shasta Park Well will operate 65% of the time, producing 1,462 acre-feet per year (AFY). In dry years, the well operation will increase to 100% of the time, producing 2,250 AFY and offsetting surface water diversions, thereby reducing the impact on the lower American River. In wet years, the well will only be operated 15% of the time, producing 337 AFY.

The Shasta Park Reservoir and Well Project also contains an educational aspect. Since the project site is near a library and park, informational kiosks will be installed to inform passersby about the City of Sacramento's water system and the importance of sustainable water resource management.

### Project Performance Measures Table

Table 4 is the Project Performance Measures Table for the Shasta Park Reservoir and Well Project. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

The monitoring measures that will be performed by the City of Sacramento for the Shasta Park Reservoir and Well Project are similar to the measures for the City's E.A. Fairbairn Groundwater Well Project. In addition to the water meter and water level data to determine volume of water extracted and delivered and changes in the groundwater elevations, the City will also gather pressure gauge data to monitor system pressures following reservoir completion. The pressure gauges will be monitored daily to evaluate system performance.

**Table 4: Shasta Park Reservoir and Well Project Performance Measures Table**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Increase conjunctive use</li> <li>- Utilize common facilities</li> <li>- Improve water supply reliability and emergency supply</li> <li>- Maintain a sustainable groundwater and surface water supply</li> <li>- Increase water system storage for emergency and operational supply</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Extract additional groundwater from the aquifer</li> <li>- Reduce surface water diversions during dry years</li> <li>- Increased system pressure during peak hour demands</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Readings from well meters</li> <li>- Readings from distribution water meters</li> <li>- Groundwater elevation readings from wells</li> <li>- Readings from distribution system pressure gauges</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of acre-feet of surface water diverted</li> <li>- Number of acre-feet of groundwater water extracted</li> <li>- Change in groundwater elevations</li> <li>- Increase in system pressure</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - pressure gauge data  <u>Method</u> - use pressure gauges to monitor system pressures; daily analysis of data to determine system performance</p> <p><u>Tool</u> - water meter data  <u>Method</u> - use meter data to determine monthly the volume of water delivered to the distribution system</p> <p><u>Tool</u> - water level data collected via depth sounder  <u>Method</u> - evaluate data to determine changes in groundwater elevation</p> <p><u>Tool</u>- water meter data  <u>Method</u> - Use meter data to determine monthly groundwater extraction rates</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Extract between 337 AFY and 2,250 AFY from the groundwater basin depending on the year type; on average extract 1,462 AFY from groundwater basin.</li> <li>- Maintain groundwater elevations as close to current as possible</li> <li>- Maintain a minimum peak hour system pressure of 30 psi with an average of 40 psi</li> </ul>

## Project 5: Antelope Creek Water Efficiency and Flood Control Improvement Project (*Placer County Flood Control and Water Conservation District & Placer County Water Agency*)

### Project Summary

The Antelope Creek Water Efficiency and Flood Control Project is a collaborative, multi-objective project that covers water supply, water quality, flood protection, ecosystem restoration and public recreation objectives. The main components of this project are the reconstruction of portions of the Antelope and Caperton Canals, which are raw water canals operated by Placer County Water Agency (PCWA), and the installation of on-channel flood control weirs along Antelope Creek, which is a natural waterway within the jurisdiction of Placer County Flood Control and Water Conservation District. Specific habitat enhancements for fisheries, removal of invasive plant species, native species planting and trail enhancements are also planned as part of the project.

Proposed work in the Antelope and Caperton Canals consists of installing energy dissipaters and/or other features to capture sediment at canal release points and heightening the canal walls where the potential for overtopping exists. Whereas much of the existing canal is constructed of native soils and timbers, the reconstruction work will employ gunite, a cement and sand mixture. The gunite-lined portions of the canals will reduce water conveyance losses and will improve water quality through reduced contact between the raw water and bare earth. This portion of the project is estimated to conserve between 80 to 125 AFY of raw water.

Proposed work in Antelope Creek consists of installing two on-channel flood control weirs along an open space-protected reach of the creek. Construction of these weirs will be combined with bank re-contouring to improve floodplain storage and connectivity. These stream enhancements will provide significant flood reduction benefits to downtown Roseville (an area which has been subjected to repeated flood damage) while also enhancing riparian corridor ecosystems and improving groundwater recharge through natural treatment and filtering within the floodplain. This portion of the project is estimated to reduce peak flows at critical locations within downtown Roseville by as much as 530 cubic feet per second (cfs) during a 100-year event.

The Antelope Creek Water Efficiency and Flood Control Project will be implemented in two phases. The first phase includes the improvements to Antelope Canal and the construction of an on-channel weir on Antelope Creek near Atlantic Street in the City of Roseville. The second phase includes the improvements to Caperton Canal and the construction of an on-channel weir on Antelope Creek in the vicinity of the Roseville Parkway crossing. Only the first phase is proposed to be funded by the Proposition 84 Implementation Grant Program.

### Project Performance Measures Table

A Project Performance Measures table has been created for the Antelope Creek Water Efficiency and Flood Control Project to indicate the project goals, desired outcomes, output indicators, output indicators, measurement tools and methods and targets (Table 5). This table will be updated prior to project

implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

Some of the monitoring measures that will be conducted as part of the project performance monitoring program include reviewing field records to compare canal wall height before and after project implementation, spot checking the site to count the number of visitors, reviewing ALERT stage gage recordings to compare pre- and post-implementation data, and comparing water sampling collections, lab analyses, upstream and downstream meter measurements, seepage from the canal, and field turbidity tests before and after project implementation. These measures will help evaluate the output indicators and outcome indicators to ultimately determine to what extent the project is meeting its goals and desired outcomes.

**Table 5: Antelope Creek Water Efficiency and Flood Control Project Performance Measures Table**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Provide regional flood control benefits to critically impacted areas of Roseville and unincorporated Placer County</li> <li>- Increase water supply reliability</li> <li>- Improve an existing recreational corridor</li> <li>- Improve water quality</li> <li>- Restore riparian corridor and floodplain habitat</li> <li>- Reduce the potential of sediment from entering Antelope Creek from controlled releases of water from the Antelope Canal</li> <li>- Reduce the potential of the canal of overtopping</li> <li>- Improve public education</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Increase canal wall height</li> <li>- Provide peak flood flow reduction within the Dry Creek Watershed</li> <li>- Provide improved public access and educational opportunities along recreational corridor</li> <li>- Reduce sediment loading into Antelope Creek</li> <li>- Improve habitat for special status species</li> <li>- Increase efficiency of raw water deliveries</li> <li>- Restore native vegetation to creek corridor</li> <li>- Reduction of water losses from seepage</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Field inspection records for native vegetation establishment</li> <li>- Visitor counts</li> <li>- Readings/data recorded of creek stage from stream level gages</li> <li>- Pumping records from American River</li> <li>- Creek water quality sample analyses</li> <li>- Reduction in the amount of water seeping from the canal outlet(s)</li> <li>- Reduction in the amount of water seepage from the canal</li> <li>- Readings from the existing gauging station at the head of the Antelope Canal</li> <li>- Monitoring reports indicating acceptable establishment</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of feet increase in canal wall height</li> <li>- Change in peak flows (cfs) during flood events</li> <li>- Number of visitors using the trails</li> <li>- Number of acre-feet of water pumped to Antelope Canal from American River</li> <li>- Quantity of total suspended solids (TSS) in water samples</li> <li>- Volume of water diverted into the Antelope Canal</li> <li>- Reduction in the amount of water placed into the Antelope Canal</li> <li>- Field turbidity tests of the water being released from the canal and from where the water enters Antelope Creek</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - field records</p> <p><u>Method</u> - compare canal wall height before and after the project</p>

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	<p><u>Tool</u> - count number of visitors to the site <u>Method</u> - periodically spot check the site to determine the number of visitors and compare to pre-project visitor counts</p> <p><u>Tool</u> - ALERT stage gage recordings <u>Method</u> - data collected automatically during flood events; comparison of pre- and post-construction data to demonstrate peak flow reduction</p> <p><u>Tool</u> - Water Quality Testing <u>Method</u> - comparison of water sample collection and laboratory analyses before and after project completion</p> <p><u>Tool</u> - Mitigation monitoring of vegetation <u>Method</u> - Annual mitigation report of vegetation establishment</p> <p><u>Tool</u> - Inflow/outflow measurements of the section(s) of canal to be raised <u>Method</u> - comparisons of upstream and downstream current meter measurements of the sections of canal identified in this project</p> <p><u>Tool</u> - quantifying the amount of water savings at canal outlets <u>Method</u> - Volumetric testing of the amount of water seeping from canal outlets before and after project completion</p> <p><u>Tool</u> - HACH Turbidity meter <u>Method</u> - Field turbidity tests of the water to determine effectiveness of energy dissipater; comparison of pre- and post-construction data to demonstrate turbidity reduction</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Reduce peak flow by 530 cfs in 100-year event at Vernon Street in Roseville</li> <li>- Increase number of visitors to the site by 10% more visitors per day</li> <li>- 5% reduction in average TSS measured in water at baseline established levels</li> <li>- 80% successful establishment of new native vegetation</li> <li>- Reduce turbidity levels downstream of energy dissipaters</li> <li>- Reduce water loss by 80 to 125 AFY from canal outlets and seepage within the project canal sections.</li> </ul>



## Project 6: Regional Water Meter Retrofit Acceleration Project (*Regional Water Authority*)

### Project Summary

The Regional Water Meter Retrofit Acceleration Project will install 840 additional residential meters in the service areas of three of the largest local public water suppliers in the region: the City of Sacramento, Sacramento Suburban Water District (SSWD), and Sacramento County Water Agency (SCWA). The project, which is being coordinated by the Regional Water Authority (RWA), will be implemented within each of the three service areas by the respective water supplier.

The greater Sacramento region has made commendable progress towards metering its water service connections to meet the 2025 state mandate; over 50% of the areas connections are now metered. However, with additional funding, the installations could be significantly accelerated, and correspondingly, water savings would be realized sooner. The California Urban Water Conservation Council (CUWCC) estimated that the installation of water meters corresponds to 20% water savings, which for this project translates to 126 AFY.

While the Regional Water Meter Retrofit Acceleration Project is only at the conceptual design phase (as defined by the Proposition 84 Implementation Proposal Solicitation Package), upon a funding commitment on June 1, 2011, the project would quickly proceed to final design and construction. Because of the high level of current implementation and experience with these meter retrofits, the final design can be expedited. Furthermore, each of the implementing agencies selects a contractor to perform similar work on a fiscal year basis, and those annual contracts can be modified to incorporate the Regional Water Meter Retrofit Acceleration Project, eliminating the schedule delays often associated with the bidding and award process.

### Project Performance Measures Table

The following is a Performance Measures Table for the Regional Water Meter Retrofit Acceleration Project. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

The purpose of this project is to accelerate the installation of residential water meters in the region in order to be fully metered by the year 2025. By installing meters, water efficiency will be improved and water consumption will diminish. RWA will be leading the project and will track the number of meters that the City of Sacramento, SSWD, and SCWA each install in their service areas. Once the meters are installed, the volume of water delivered to the user will be tracked in order to determine the reduction in water consumption.

**Table 6: Regional Water Meter Retrofit Acceleration Project Performance Measures Table**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Accelerate installation of residential water meters in the region</li> <li>- Improve water use efficiency in the region</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Install 840 meters over and above the planned water meter installations for the period.</li> <li>- Better customer understanding of water use</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Meter installation tracking</li> <li>- Readings from new meters</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of meters installed</li> <li>- Number of acre feet of water delivered</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - residential water meter data  <u>Method</u> - compare monthly residential water use prior to volumetric billing rates to water use following implementing volumetric billing.</p> <p><u>Tool</u> - residential water meter data  <u>Method</u> - provide customer information on their water use and impact on water bill as a result of that use.</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Reduce average customer use at the metered accounts by 20% per year</li> <li>- Reduce water consumption by 126 AFY</li> </ul>

## Project 7: Regional Indoor and Outdoor Water Efficiency Project (*Regional Water Authority*)

### Project Summary

The Regional Indoor and Outdoor Water Efficiency Project was developed by water purveyors in the greater Sacramento region to increase the level of water conservation and ensure a long-term water supply for the region's urban and agricultural users. The plan promotes water management strategies that support environmental needs in the lower American River as well as the State's goal of a 20% reduction in per-capita water use by 2020.

The Regional Indoor and Outdoor Water Efficiency Project proposes to implement four of the water conservation components identified in the California Urban Water Conservation Council's Memorandum of Understanding (MOU) for Best Management Practices (BMPs) to conserve an estimated 9,615 AF of water over the life of these four programs. The four programs are: (1) interior water conservation retrofits for residential customers (including disadvantaged households); (2) exterior water use surveys (landscape audits) and irrigation system upgrade incentives for residential accounts; (3) exterior water use surveys and irrigation system upgrade incentives for residential and landscapes commercial, industrial, institutional (CII) accounts with large landscapes; and (4) preparation of water use budgets for accounts with dedicated landscape meters. The targeted retrofits for disadvantaged households are included because DACs are often unable to afford the upfront capital to participate in conservation programs. The water use surveys and system upgrades and the landscape budgets were selected because landscape water use is the largest component of water use in the region.

### Project Performance Measures Table

Table 7 represents the Project Performance Measures Table for the Regional Indoor and Outdoor Water Efficiency Project. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

The overall goal of this project is to improve regional water use efficiency and reduce water consumption in the region. Success of the project will be measured by reading residential water meters, CII meters, and dedicated landscape meters to collect data and compare monthly water use before and after project implementation. RWA will also track the number of surveys conducted, the number of ultra-low flow toilets installed, and the total amount of water saved.

**Table 7: Regional Indoor and Outdoor Water Efficiency Project Performance Measures Table**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Improve regional water use efficiency</li> <li>- Implement CUWCC BMPs</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Reduce water consumption by Sacramento area households (including disadvantaged customers)</li> <li>- Reduce exterior single-family water use</li> <li>- Reduce exterior water use for residential and CII customers with large landscapes</li> <li>- Ensure landscapes are being watered as needed and not over-watered</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Residential meter readings</li> <li>- CII meter readings</li> <li>- Dedicated landscape meter readings</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of surveys conducted</li> <li>- Number of ULFT installed</li> <li>- Number of acre-feet of water saved</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - residential water meter data <u>Method</u> - compare monthly residential water use prior to and following retrofits</p> <p><u>Tool</u> - residential water meter data <u>Method</u> - compare monthly residential water use prior to and following exterior water use surveys and incentives</p> <p><u>Tool</u> - CII water meter data <u>Method</u> - compare monthly CII water use prior to and following exterior water use surveys</p> <p><u>Tool</u> - dedicated landscape water meter data <u>Method</u> - compare monthly landscape water use prior to and following budget completion</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Retrofit 1,098 Sacramento area homes with water efficient fixtures</li> <li>- Conduct 285 single family exterior water use surveys</li> <li>- Conduct 76 residential and/or CII exterior water use surveys where large landscapes are irrigated</li> <li>- Prepare 404 water budgets for dedicated landscape irrigation meter customers</li> <li>- Conserve 9,615 AF of water through project life</li> </ul>

## Project 8: Sacramento Regional County Sanitation District/ Sacramento Power Authority Recycled Water Project (*Sacramento Regional County Sanitation District*)

### Project Summary

The Sacramento Regional County Sanitation District (SRCSD)/Sacramento Power Authority (Authority) Recycled Water Project seeks to match water quality with water use by making recycled water from the Sacramento Regional Wastewater Treatment Plant (SRWTP) Water Reclamation Facility (WRF) available to the Authority's Campbell Soup Cogeneration Plant (Cogeneration Plant). The City of Sacramento currently supplies potable surface water to the Authority to meet the water needs of the Cogeneration Plant, which has a water demand of approximately 1 mgd, or approximately 1,000 AFY; this potable water is used primarily to meet non-potable water demands in the Cogeneration Plant's cooling towers. The quality of the recycled water produced by SRCSD at its SRWTP WRF is a good fit to meet the non-potable water demands at the Cogeneration Plant.

The Sacramento Regional County Sanitation District/Sacramento Power Authority Recycled Water Project includes the design and construction of the necessary treatment and transmission facilities for SRCSD to serve recycled water to the Cogeneration Plant. The project is expected to include approximately 5.5 miles of 12-inch diameter transmission pipeline, modifications to the piping system and associated appurtenances at the Cogeneration Plant, and piping and infrastructure modifications at the SRWTP WRF.

### Project Performance Measures Table

The Sacramento Regional County Sanitation District/Sacramento Power Authority Recycled Water Project Performance Measures Table is shown in Table 8. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

In implementing its Project Performance Monitoring Plan, SRCSD will track monthly recycled water deliveries, review customer feedback regarding recycled water quality and delivery, and test the recycled water quality to ensure Title 22 requirements are met. The project will replace potable water with recycled water, so SRCSD will track the total volume of potable water saved after project implementation.

**Table 8: Sacramento Regional County Sanitation District/ Sacramento Power Authority Recycled Water Project Performance Measures Table**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Maximize use of recycled water to local industries, public facilities, and other users</li> <li>- Increase water supply reliability</li> <li>- Provide high quality reclaimed water to ensure protection of human health and public acceptance of reclaimed wastewater</li> <li>- Reduce use of potable water to meet non-potable water demands</li> <li>- Protect existing surface water and groundwater sources</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Meet demand of urban/industrial users using recycled water</li> <li>- Augment local water supplies and provide a reliable and sustainable water supply through recycled water</li> <li>- Ensure compliance with Title 22 requirements</li> <li>- Increase awareness and understanding of the benefits of recycled water</li> <li>- Less surface water and groundwater pumped to meet industrial non-potable water needs</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Wastewater treatment plant production data for recycled water</li> <li>- Readings from recycled water distribution meters</li> <li>- Readings from reclamation booster pumping station</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of acre-feet of recycled water produced annually</li> <li>- Number of acre-feet of recycled water delivered annually</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - Flow meter records from reclamation booster pumping station  <u>Method</u> - track recycled water deliveries on a monthly basis</p> <p><u>Tool</u>- recycled water user agreement  <u>Method</u> - use executed user agreements as means of managing recycled water deliveries</p> <p><u>Tool</u> - customer survey  <u>Method</u> - use customer feedback and opinions to ensure recycled water quality and delivery</p> <p><u>Tool</u>- water quality testing  <u>Method</u> - use laboratory analysis to ensure that recycled water meets Title 22 quality and to provide monitoring and reporting to RWQCB</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Replace approximately 1,000 AFY of potable water with recycled water</li> <li>- Produce approximately 1,000 AFY of recycled water</li> <li>- Deliver approximately 1,000 AFY of Title 22 quality recycled water</li> </ul>

## Project 9: North Antelope Booster Pump Station Project (*Sacramento Suburban Water District*)

### Project Summary

The North Antelope Booster Pump Station Project is a conjunctive use project that will be implemented by SSWD for the benefit of neighboring San Juan Water District (SJWD) retail customers. As documented in SSWD's 2009 *Water System Master Plan*, SSWD has sufficient water supplies to meet its current and projected future demands; however, other districts in the region are not capable of increasing their own supply and the addition of a conjunctive use program would provide a regional benefit. Accordingly, SSWD has developed and is implementing a conjunctive use program, of which the North Antelope Booster Pump Station Project is a part.

This project will construct a booster pump station with a design flow of 4,200 gallon per minute (gpm) that will allow for the reversal of flow in the Antelope and Cooperative Transmission Pipelines. Currently, surface water from SJWD Sidney Peterson Water Treatment Plant is transmitted to Citrus Heights Water District, Fair Oaks Water District, Orange Vale Water Company, SSWD and SJWD through these pipelines. With the exception of SSWD, the SJWD customers all rely heavily on surface water for their supply. The North Antelope Booster Pump Station Project will allow SSWD to export banked groundwater from its North Service Area to the other agencies connected to the transmission pipelines, providing them with a secondary source of supply in dry years and times of emergency. By offsetting surface water users' demand for surface water diversions in dry years, this project also benefits the lower American River ecosystem.

### Project Performance Measures Table

The following table presents a draft Project Performance Measures Table for the North Antelope Booster Pump Station. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

SSWD will monitor meter readings and groundwater elevations as part of its Project Performance Monitoring to determine the quantity of groundwater pumped/extracted, the rate of movement in the groundwater basin, and the change in groundwater elevations. Monitoring this information will help SSWD determine if the project is increasing groundwater banking capacity, improving water supply reliability, emergency supply response, and conjunctive use ability.

**Table 9: North Antelope Booster Pump Station Project Performance Measures Table**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Increase groundwater banking/exchange capacity</li> <li>- Increase water supply reliability</li> <li>- Increase conjunctive use ability</li> <li>- Improve emergency supply response</li> <li>- Allow broader water transfer capabilities</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Move banked groundwater back to depositing agencies</li> <li>- Move extracted groundwater to San Juan Family Agencies in water shortage years</li> <li>- Allow more agencies to participate in conjunctive use program</li> <li>- Act as an emergency interconnect for San Juan Family agencies</li> <li>- Provide opportunity for more agencies to participate in water transfers</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Readings from meter on outlet side of pump station</li> <li>- Readings from system well production meters</li> <li>- Groundwater elevation readings from system wells</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Quantity of acre-feet distributed via the booster pump station</li> <li>- Quantity of acre-feet of groundwater extracted</li> <li>- Change in groundwater elevations</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - production meter data  <u>Method</u> - use meter data to monitor time increment totals of water moved, rate of movement and performance of station pumps</p> <p><u>Tool</u> - well production meter data  <u>Method</u> - use well meter data to monitor increase totals of groundwater extracted</p> <p><u>Tool</u> - water level data collected  <u>Method</u> - use groundwater elevation readings to monitor level differences</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Pump between 1,600 and 5,000 AFY to system</li> <li>- Provide emergency intertie connection with a number of agencies</li> <li>- Engage three new agencies in regional conjunctive use program</li> </ul>



## Project 10: Coyle Avenue & Roseview Park Pump Stations and Treatment Systems Project (*Sacramento Suburban Water District*)

### Project Summary

The Coyle Avenue and Roseview Park Pump Stations and Treatment Systems Project is another component of SSWD's conjunctive use program. This project involves the construction of one well, pump station and treatment system at each of two sites within SSWD's North Service Area. Each of the new wells will be a 16-inch diameter steel well that will replace an existing groundwater extraction well in the North Service Area. The proposed well sites, namely Coyle Avenue Elementary School's soccer fields and Roseview Park, are both north of a region-wide groundwater cone of depression and regional contamination plumes.

The Coyle Avenue Well will have a pumping capacity of 2,250 acre-feet per year (1,400 gpm), as documented in the *Coyle Avenue Exploration Summary and Well Design Recommendations Technical Memorandum* (Luhdorff and Scalmanini, January 2010) while the Roseview Park Well will have a capacity of 3,500 acre-feet per year (2,200 gpm). These additional extraction facilities, combined with previously banked groundwater, will allow SSWD to increase groundwater use during dry periods, leaving additional surface water in the American River for habitat protection and to meet water quality objectives. Wellhead treatment systems at each site will consist of chlorination for disinfection and, if necessary, direct-filtration treatment for manganese removal.

### Project Performance Measures Table

The following table, Table 10, is the Project Performance Measures Table for the Coyle Avenue & Roseview Park Pump Stations and Treatment Systems Project. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals. The measurement methods that have been identified include using pump station meter data to monitor time increment total of water moved, using well meter data to monitor water delivered, and using groundwater elevation readings to monitor groundwater levels. The production meter data and groundwater level data will be collected by SSWD staff and evaluated to ensure groundwater banking capacity increases, water supply reliability increases, emergency supply response improves, and groundwater sources are protected after project implementation.

**Table 10: Coyle Avenue & Roseview Park Pump Stations and Treatment Systems Project  
Performance Measures Table**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Increase groundwater banking capacity</li> <li>- Increase water supply reliability</li> <li>- Increase conjunctive use ability</li> <li>- Improve emergency supply response</li> <li>- Protect existing groundwater sources</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Extract groundwater from aquifers used in banking program</li> <li>- Distribute extracted groundwater in former Arvin area water system</li> <li>- Increase production system performance</li> <li>- Provide additional data for groundwater basin management</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Readings from well meter</li> <li>- Readings from distribution water meters</li> <li>- Groundwater elevation readings from system wells</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Quantity of acre-feet groundwater extracted</li> <li>- Quantity of water delivered</li> <li>- Change in groundwater elevation</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - production meter data  <u>Method</u> - use meter data to monitor time increment totals of water moved, rate of movement and performance of station pumps</p> <p><u>Tool</u> - well production meter data  <u>Method</u> - use well meter data to monitor increase totals of water delivered</p> <p><u>Tool</u> - water level data collected  <u>Method</u> - use groundwater elevation readings to monitor level differences</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Extract an average annual of 2,000 AFY from the groundwater basin</li> <li>- Meet average year water demands 100% of the time</li> </ul>

## Project 11: Willow Hill Pipeline Rehabilitation Project (*City of Folsom*)

### Project Summary

The Willow Hill Pipeline Rehabilitation Project is one project contained in the City of Folsom's System Operation Review (SOR) Program. The objective of the SOR Program is to optimize the City's water distribution system by minimizing unaccounted water losses and maximizing conservation through water efficiency improvements, thereby ensuring long-term sustainability of the City's water supplies. The City of Folsom has one of the highest per capita water usages in the state (an estimated 357 gallons per day [gpd] versus a statewide average of 164 gpd) and unaccounted system-wide water losses of over 17% (as compared to an industry standard of 10%). Given these figures, the City is confident that it can achieve water savings of 5,000 to 10,000 AFY, or approximately 15 to 30% of its total water supplies, through system efficiency measures upon full implementation of all measures. The water savings realized through these optimization efforts can be used for banking, sale, lease, exchange or short- or long-term transfers within the Sacramento Central Groundwater Basin.

The Willow Hill Pipeline Rehabilitation Project was identified as a key project through the SOR Program. A water audit performed in 2008 indicated that the Willow Hill System loses an average of 1,100 AFY. Rehabilitation of the system's pipelines, reservoir and associated appurtenances will greatly aid the City in reducing its total real losses, conserving approximately 1,100 AFY. Additional benefits offered by this project are increased lifespan of the City's distribution infrastructure due to system rehabilitation, the potential to sustain environmental flows in the lower American River during dry years and support of the State's goal of a 20% reduction in per-capita water use by 2020.

### Project Performance Measures Table

The following table presents Project Performance Measures for the City of Folsom's Willow Hill Pipeline Rehabilitation Project. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

The implementation of the City of Folsom's pipeline rehabilitation project will ultimately conserve approximately 1,100 AFY, improving water supply efficiency and reliability and maximizing City funds and resources. City staff will read the meters on the raw water pipeline (located at the beginning and end of the pipeline) to determine water loss throughout the pipeline and compare pre- and post-implementation project values.

**Table 11: Willow Hill Pipeline Rehabilitation Project Performance Measures Table**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Improve water supply efficiency</li> <li>- Increase water supply reliability</li> <li>- Maximize city funds and resources</li> <li>- Reduce energy usage related to water and wastewater treatment</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Substantial reduction in pipeline losses</li> <li>- Increase water distribution system reliability</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Readings from raw water pipeline meters (at beginning and end of pipeline)</li> <li>- Energy usage</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of acre-feet of water saved annually</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - pipeline water meters at beginning (Randall Drive) and end (Willow Hill Reservoir) of pipeline</p> <p><u>Method</u> - compare pre-and post-project water meter data to demonstrate loss reduction</p> <p><u>Tool</u> - power bills</p> <p><u>Method</u> - compare power bills prior to project implementation and after implementation</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Conserve approximately 1,100 AFY of water</li> <li>- Reduce energy usage by 512 MWh per year</li> </ul>

## Project 12: Lower American River Mile 0.5 Aquatic Riparian Habitat Enhancement Project (*Sacramento Area Flood Control Agency*)

### Project Summary

The Lower American River Mile 0.5 Aquatic Riparian Habitat Enhancement Project is a floodplain management project that offers significant environmental benefits. The project is located in the American River Parkway at River Mile 0.5R (RM 0.5R), which is one-half mile upstream of the confluence of the American River with the Sacramento River. The project site consists of the north bank of the river and the floodplain on top of the bank. The goal of the project is to increase the frequency of flooded habitat available for fish in the American and Sacramento Rivers during the winter and spring and to improve riparian habitat for birds and other wildlife species.

The project will be implemented over two construction seasons. The first construction season will involve elderberry transplants, non-native species removal, and new plantings. Elderberry shrubs, which occupy approximately 2.5 acres of the 3.3 acres that was identified for floodplain habitat, will be transplanted into 10 acres of upland that is currently covered in non-native weedy grasses, blackberry vines, and a few native trees. Prior to the elderberry transplant, the upland site will be cleared of non-native species. Elderberry seedlings and associated riparian species will also be planted around the transplanted shrubs. The second construction season will involve lowering and re-grading of the river bank at RM 0.5R. The existing bank, which is over-steepened and eroding, will be reshaped to create fish and wildlife habitat. After the bank is reshaped, instream woody material and brush mattresses will be installed to reduce erosion potential and to provide additional fish habitat. Finally, a thick band of native vegetation will be established near the river, and less dense and varied vegetation will be established over the rest of the site.

### Project Performance Measures Table

Table 12 is the Project Performance Measures Table for the Lower American River Mile 0.5 Aquatic Riparian Habitat Enhancement Project. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

Outcome indicators for the project include the number of acres of floodplain inundated, the number of acres of native species habitat created and established, and the identification of use of the site by target species. Monitoring efforts including plant surveys and snorkel surveys (or other method deemed appropriate) will be implemented to evaluate coverage by native species and juvenile fish in the created habitat. Sacramento Area Flood Control Agency will collect and evaluate the data from field surveys, aquatic surveys, fish counts and measurements of acreage.

**Table 12: Lower American River Mile 0.5 Aquatic Riparian Habitat Enhancement Project  
Performance Measures Table**

<b>Project Goals</b>	- Increase floodplain habitat for sensitive aquatic species
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Increase shoreline habitat</li> <li>- Increase floodplain habitat access at low water levels</li> <li>- Demonstrate use of the habitat</li> <li>- Increase shaded riparian aquatic habitat</li> <li>- Improve fraction of plant community consisting of native riparian species</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Data from field surveys</li> <li>- Data from aquatic surveys</li> <li>- Fish counts observations</li> <li>- Acreage of restored habitat</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of acres of floodplain inundated</li> <li>- Number of acres of native species habitat</li> <li>- Confirmation of target species using site</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - as-built plans <u>Method</u> - confirm site built as designed</p> <p><u>Tool</u>- plant survey <u>Method</u>- survey canopy coverage by native species</p> <p><u>Tool</u>- snorkel survey or other method deemed appropriate <u>Method</u> - confirm juvenile fish of target species using created habitat</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Create 3.3 acres of new floodplain and restore 5 acres of habitat</li> <li>- Provide 70% plant survival in 3 years and over 50% relative cover by native species in five years</li> <li>- Demonstrate use of site by steelhead, delta smelt, and/or Chinook salmon within 5 years</li> </ul>

## Project 13: Lower Cosumnes River Floodplain Restoration Project (*Ducks Unlimited*)

### Project Summary

The Lower Cosumnes River Floodplain Restoration Project is located within the Cosumnes River Preserve-Cougar Wetlands Unit in the upper Sacramento-San Joaquin Delta. The Cosumnes River Preserve is a collaborative partnership between federal, state, and private landowners to conserve, restore, and manage the upland, wetland, riparian, and riverine habitat associated with the lower Cosumnes River. The Cougar Wetlands Unit was historically an active floodplain of the Cosumnes River (the last free-flowing river on the west slope of the Sierra Nevada), but was leveled for agricultural uses decades ago. Numerous irrigation diversions along the Cosumnes River prevent the reach just upstream of the proposed project from sustaining perennial flows, yet the lower portion of the Cosumnes River is tidally influenced to a point also just upstream of the project, making it ideal to provide perennial, off-channel habitat for multiple Federally-listed species, including giant garter snake and fall-run Chinook salmon. The Lower Cosumnes River Floodplain Restoration Project provides a rare opportunity to restore historic floodplain connectivity to the lower portion of a Central Valley river, assisting in endangered species recovery and rare habitat restoration.

This project includes levee breaching, recreation of historic sloughs and off-channel wetlands, and installation of fish screens on existing water intake structures. These tasks will result in 143 acres of additional floodplain, riparian forest habitat, juvenile salmon rearing habitat, and potential giant garter snake foraging habitats. Preservation of riparian forest is integral to providing suitable salmon and giant garter snake habitat. The Cosumnes River Preserve protects some of the last remaining old-growth gallery riparian forest in the Central Valley, and this project will focus on the restoration of this habitat type.

Additional benefits offered by this project include reduced flooding in the lower Cosumnes and Mokelumne Rivers and enhanced groundwater recharge.

### Project Performance Measures Table

Table 13 is the Lower Cosumnes River Floodplain Restoration Project Performance Measures Table which will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project. Data will be collected and monitoring measures will be performed as a means of reporting on the projects achievements relative to its overall goals. The number of salmonids using the restored habitat will be determined and tracked, the frequency of restored floodplains inundation will be monitored, the number of youth and disabled visitors to the site, and the number of acres of restored floodplain will be determined. These monitoring measures will help Ducks Unlimited determine whether the project is successfully restoring the floodplain and riparian forest ecosystem, facilitating recovery of endangered and sensitive species, and providing recreational opportunities to youth and disabled persons. Various tools will be utilized including record drawings, fish monitoring, water level recorders, vegetation monitoring, and public use records.

**Table 13: Lower Cosumnes River Floodplain Restoration Project Performance Measures Table**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Restore historic floodplain hydrodynamics and riparian forest ecosystem</li> <li>- Facilitate recovery of Federally endangered and sensitive species (GGS and FRCS)</li> <li>- Provide recreational opportunities for youths and disabled persons</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Restoration of floodplain hydrodynamics on 143 acres through restoration of two former tule marsh slough channels and their connection to the river by breaching of perimeter levee that will allow juvenile fish access to rearing habitat</li> <li>- Restoration of valley oak riparian forest habitat</li> <li>- Establishment of ADA accessible paths and hunting blinds for disabled and youth waterfowlers, as well as youth education</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Acreage of restored floodplain and tule marsh sloughs</li> <li>- Documented and quantified use by juvenile salmonids</li> <li>- Number of valley oaks established</li> <li>- Amount of ADA facilities established</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of salmonids using restored habitats</li> <li>- Frequency of restored floodplains inundation relative to current conditions</li> <li>- Number of acres of restored floodplain</li> <li>- Number of youth and disabled users</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - record drawings <u>Method</u> - documentation of acreage of floodplain and tule marsh sloughs restored</p> <p><u>Tool</u> - record drawings <u>Method</u> - Documentation of ADA facilities established</p> <p><u>Tool</u> - Fish monitoring <u>Method</u> - Documentation and quantification of floodplain use by juvenile salmonids during spring floods</p> <p><u>Tool</u> - water level recorder readings <u>Method</u> - Documentation of floodplain inundation occurrence, depth and frequency</p> <p><u>Tool</u> - Vegetation Monitoring <u>Method</u> - Annual monitoring of valley oak recruitment amounts</p> <p><u>Tool</u> - Public use records <u>Method</u> - Documentation of total public usage</p>



American River Basin  
Attachment 6: Monitoring, Assessment and Performance Measures

<b>Targets</b>	<ul style="list-style-type: none"><li>- Create 143 acres of restored floodplain and tule marsh sloughs</li><li>- Develop a 1- and 2-year flood connection to floodplain</li><li>- Create two reconnected tule marsh sloughs to the Cosumnes River</li><li>- Establish 500 Valley Oak trees</li><li>- Create 500 LF of ADA accessible paths</li><li>- Create three ADA-accessible hunting blinds</li></ul>
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## Project 14: OHWD / Rancho Murieta Groundwater Recharge Project (*Omochumne-Hartnell Water District*)

### Project Summary

The OHWD/Rancho Murieta Groundwater Recharge Project is a regional conjunctive use project that will divert up to 4,000 AFY of surface water from the Rancho Murieta Community Service District (RMCS D) to groundwater recharge basins in the Omochumne-Hartnell Water District (OHWD). Through this project, OHWD will increase groundwater levels in an aquifer utilized by land owners, and RMCS D will recover banked water, as needed, to address water supply shortages.

The OHWD/Rancho Murieta Groundwater Recharge Project will be constructed in three phases. Phase 1 of the project, for which funding is being sought, will construct: a new intake facility on Cosumnes River upstream of Blodgett Dam, a 90-acre spreading basin in OHWD's service area south of Folsom South Canal between Cosumnes River and Deer Creek, and approximately 600 feet of pipeline needed to convey available water from RMCS D's surface water allocation into OHWD's infiltration basin. Phase 2, which is also part of the proposed project, involves installing a recovery well and pipeline to withdraw water during periods of water shortage. Phase 3, which is expected to be constructed within the next 10 years, will improve the efficiency of diversions through the installation of an inflatable Obermeyer weir on the upstream face of OHWD's existing flashboard dam. Each of these phases is fully independent of subsequent project phases.

### Project Performance Measures Table

The following table presents a draft Project Performance Measures Table for the OHWD/Rancho Murieta Groundwater Recharge Project. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

The OHWD/Rancho Murieta Groundwater Recharge Project will improve emergency supply response, increase water supply reliability, develop conjunctive use in the Cosumnes Groundwater Basin, and increase groundwater banking capacity. To ensure these goals are reached, OHWD will monitor water meter data on a monthly basis to determine water recharge rates and will collect water level data to monitor changes in groundwater elevation. Data collected will allow OHWD to calculate the number of acre-feet of water percolated into the groundwater basin and identify any changes in groundwater levels.

**Table 14: OHWD / Rancho Murieta Groundwater Recharge Project Performance Measures Table**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Improve emergency supply response</li> <li>- Increase water supply reliability</li> <li>- Develop conjunctive use ability in the Cosumnes basin</li> <li>- Develop groundwater banking capacity</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Recharge (percolate) surface water into the groundwater aquifer</li> <li>- Increase groundwater levels in the basin</li> <li>- Provide a drought year water supply to the residents of Rancho Murieta</li> <li>- Provide additional data for groundwater basin management</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Readings from meters at intake (pumping) structure</li> <li>- Readings from distribution water meters</li> <li>- Groundwater elevation readings from nearby wells</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of acre-feet of water percolated</li> <li>- Change in groundwater elevations</li> </ul>
<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - water meter data  <u>Method</u> - use meter data to monitor monthly water recharge rates; bi-annually analysis of meter data to evaluate recharge Basin performance</p> <p><u>Tool</u> - water level data collected via sounder regularly  <u>Method</u> - evaluate data to determine changes in groundwater elevations</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Divert, recharge and extract 4,000 AF of water per year into the groundwater basin</li> <li>- Provide Rancho Murieta with a drought year water supply when needed 100% of the time</li> <li>- Increase groundwater elevations by 2 to 5 feet in the aquifer in the next 10 years</li> </ul>

## Project 15: Sleepy Hollow Detention Basin Retrofit Project (*City of Elk Grove*)

### Project Summary

The Sleepy Hollow Detention Basin Retrofit Project is a collaborative effort among the City of Elk Grove, the Laguna Creek Watershed Council and the Sheldon Community Association. The purpose of the project is to transform an existing single-function detention basin, namely the 6.3-acre flood control basin serving the Sleepy Hollow Unit 2 subdivision in the City of Elk Grove, into a multi-functional water resource feature. The project will evaluate various enhancement alternatives that can improve water quality, provide habitat for birds and aquatic animals, enhance recreational opportunities with trail systems for public use during non-flood periods, and provide groundwater recharge opportunities through the implementation of Darcy Columns (dry wells) throughout the basin. Designs will be prepared that favor alternatives that can be implemented using low impact development techniques (e.g. all grading must be achieved with the existing footprint to have a net cut/fill of zero).

Successful implementation of the Sleepy Hollow Detention Basin Retrofit Project could act as a template for future development within the City of Elk Grove and other local jurisdictions. Additionally, the project provides a great opportunity for science education for students at five schools within a two-mile radius of the project site.

### Project Performance Measures Table

The following table presents Project Performance Measures for the Sleepy Hollow Detention Basin Retrofit Project. This table will be updated prior to project implementation and will be used to assess and evaluate the implementation and performance of the project, and as a means of reporting on the projects achievements relative to its overall goals.

City of Elk Grove staff will implement the monitoring measures identified in Table 15 for a duration of 10 years following project construction. Staff will document acres of habitat created by the project, determine changes in flood volume attenuation, conduct biological surveys throughout the year, conduct community outreach events to learn how many people use the trails, and evaluate groundwater levels. By monitoring these parameters, the City can ensure project goals are met.

**Table 15: Sleepy Hollow Detention Basin Retrofit Project Performance Measures Table**

<b>Project Goals</b>	<ul style="list-style-type: none"> <li>- Improve basin's flood attenuation performance by intercepting initial storm water volumes</li> <li>- Improve basin's pollutant removal functions</li> <li>- Enhance habitat for endangered and native wildlife species</li> <li>- Create recreational opportunities for community</li> <li>- Create a multi-functional water resource feature</li> <li>- Recharge underlying groundwater basin</li> </ul>
<b>Desired Outcomes</b>	<ul style="list-style-type: none"> <li>- Allow stormwater and nuisance runoff to percolate into subsurface permeable layers through dry wells</li> <li>- Provide better flood control capabilities</li> <li>- Improve water quality of storm runoff and prior to release into Laguna Creek</li> <li>- Increase endangered species and native wildlife population &amp; habitat</li> <li>- Increase community use of jogging/walking trails</li> <li>- Increase groundwater levels</li> </ul>
<b>Output Indicators</b>	<ul style="list-style-type: none"> <li>- Groundwater elevation readings from dry wells and/or monitoring wells</li> <li>- Flood control stage monitoring</li> <li>- Sampling of stormwater discharge that releases into adjacent creek</li> <li>- Biological survey of wildlife species using the area</li> <li>- Survey of people that use the jogging/walking trails</li> </ul>
<b>Outcome Indicators</b>	<ul style="list-style-type: none"> <li>- Number of acre-feet entering sub-surface strata</li> <li>- Flood control elevations measured at existing weir and low flow discharge point</li> <li>- pH, turbidity and various other measures of water quality pollutant levels</li> <li>- Number of endangered/local species</li> <li>- Number of people using the trail system</li> </ul>

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<b>Measurement Tools and Methods</b>	<p><u>Tool</u> - record drawings</p> <p><u>Method</u> - documentation of acreage of habitat created</p> <p><u>Tool</u> - water level data in basin measured by water level indicators collected prior, during and after significant storm events</p> <p><u>Method</u> - evaluate data to determine changes in flood volume attenuation</p> <p><u>Tool</u> - turbidity/pH meter monitoring and water sample grabs during the year</p> <p><u>Method</u> - evaluate data to determine changes in water quality</p> <p><u>Tool</u> - biologist to conduct biological surveys throughout the year</p> <p><u>Method</u> - field visits and information logging</p> <p><u>Tool</u> - City staff monitoring and community outreach events</p> <p><u>Method</u> - City staff to conduct field visits during various parts of the year to determine number of people using trails. Also conducting outreach through workshops, telephone call, field visits to learn how many people use trails.</p> <p><u>Tool</u> - water level data collected via depth sounder</p> <p><u>Method</u> - Evaluate changes in groundwater elevations</p> <p><u>Tool</u> - Surveys</p> <p><u>Method</u> - Documentation of total public usage</p>
<b>Targets</b>	<ul style="list-style-type: none"> <li>- Increase existing groundwater elevations by 10% of existing level</li> <li>- Improve stormwater quality versus current condition by 10%</li> <li>- Improve number of endangered/local wildlife species versus current conditions by 50%</li> <li>- Have 100 local residents use the jogging/walking trail</li> <li>- Reduce the 10-year and 100-year storm elevations in detention basin</li> </ul>